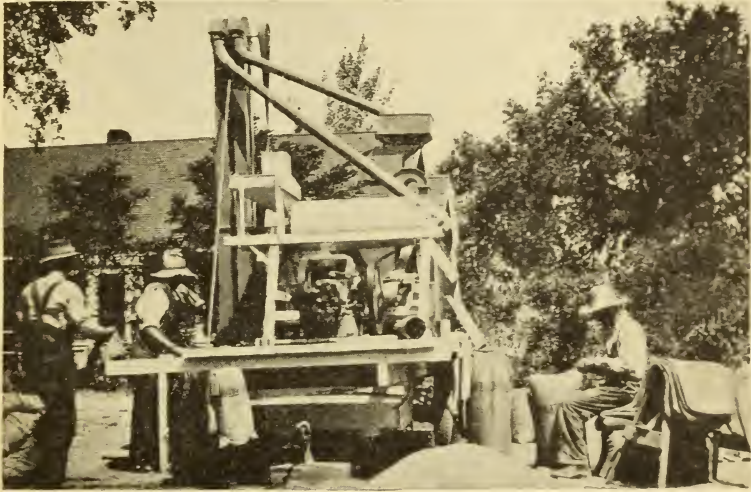


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*The* COMBINATION  
CLEANING<sup>AND</sup> TREATING  
OF SEED WHEAT



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# THE COMBINATION CLEANING AND TREATING OF SEED WHEAT

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## CLEANING AND TREATING SEED WHEAT PROFITABLE

THE INTEREST shown in the cleaning and treating of seed wheat has led to important developments in the wheat-improvement program during recent years. For some time the number of farmers who clean their grain before sowing has been steadily increasing. Likewise, as the growing danger from stinking smut (bunt) has come to be recognized, seed treatment has gained in popularity. With the copper-carbonate dust seed treatment coming into almost general use, the way is now open for rapid progress in both weed and smut control, for cleaning and treating seed wheat can readily be made a joint operation.

### Weeds Mean Waste

Weeds that grow in the wheat fields cause losses to producers in several ways. They use up soil moisture and available plant food. Tall leafy weeds crowd and shade the surrounding grain, retarding its growth and ripening. At the time of threshing, many weed seeds are immature and contain large quantities of moisture, and this often causes the grain to heat and spoil in storage. It not only costs as much to thresh, handle, store, and ship a given quantity of weed seeds as it does an equal quantity of grain, but on arrival at market weed seeds mixed with the wheat frequently reduce its commercial grade and value.

Certain weed seeds impart a disagreeable odor and taste to flour and bread made from wheat containing them.

### Weed Losses Can Be Reduced

Losses from weeds can be reduced by using improved cultural methods and by thoroughly cleaning the grain that is to be used for seed. The cleaning operation, when efficiently performed with proper machinery, removes not only the weed seeds, including wild oats, but also the shrunken grains and broken kernels. (Fig. 1.) The weed seeds and wheat kernels that are removed in cleaning the wheat are not wasted, for they can be used as feed for poultry and livestock.

Several types of efficient cleaning machines designed for farm use are now on the market. Farmers' Bulletin 1542<sup>2</sup> describes several of these machines and gives information concerning their method of operation.

### Stinking Smut a Serious Enemy of Wheat

Stinking smut, a disease that occurs practically wherever wheat is grown, brings reduced yields and discounts in price at the market.

<sup>1</sup> Mr. Coke was formerly assistant county agent in San Luis Obispo County, Calif.

<sup>2</sup> BLACK, R. H., and BOERNER, E. G. CLEANING GRAIN ON FARMS AND IN COUNTRY ELEVATORS. U. S. Dept. Agr. Farmers' Bul. 1542, 27 p., illus. 1927.



In addition to these certain losses where smut in quantity is present, there is the danger of smut-dust explosions in threshing machinery, particularly in dry areas on the Pacific coast.

Stinking smut is caused by a parasitic fungus. At harvest, instead of producing wheat kernels, the diseased plants produce heads containing smut balls which are filled with a foul-smelling mass of powder. Examination of the powder under the microscope reveals the fact that it consists of a vast quantity of spores or seed bodies of the fungus. When a crop containing smutty heads is threshed and handled, these spores become scattered through the sound grain.

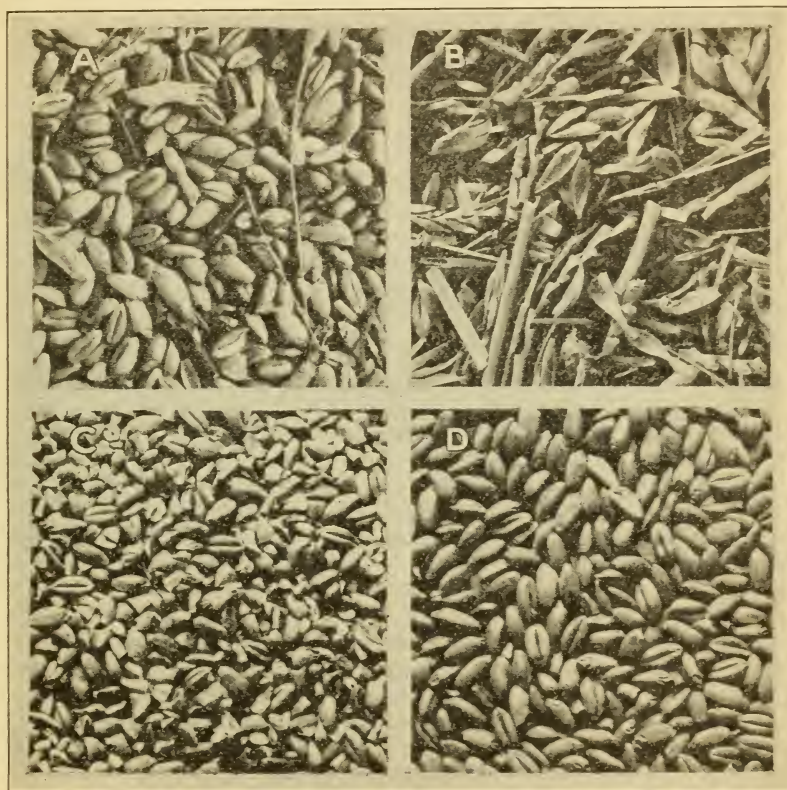


FIG. 1.—Wheat cleaned and treated with a portable power-driven combination grain-cleaning and dust-treating machine. A, Original grain containing weed seeds, foreign material, and smut balls; B, wild oats and coarse foreign material; C, small weed seeds and broken and small-sized wheat kernels removed in cleaning; D, seed wheat after cleaning and dusting with copper-carbonate dust

If only a few such spores are present on a grain of seed wheat, there is a chance that the disease will appear on the plant grown from that seed, for if conditions following seeding are favorable for the fungus (that is, if the weather is cool and moist), the spores and seed wheat germinate at approximately the same time, and the threadlike fungus attacks the young plant, gaining entrance to its tissues. Once this has been accomplished, the growth of the fungus keeps pace with that of the wheat plant. When the head is formed, the fungus takes possession, and, instead of the kernels that normally develop, smut balls are formed.

### **Smut-Resistant Varieties a Possibility**

Smut control by means of resistant varieties is a possibility. It has already met with some success in certain areas where a few varieties that are highly smut resistant have been developed and are being grown. It has not been possible, however, in the time that breeding for smut resistance has been under way, to develop resistant varieties for all areas or to eliminate smut entirely in any area by this means. Resistant varieties adapted to most of the principal wheat-growing sections are not now available. It is probable that seed treatment must be relied upon for smut control for many years, while breeding operations are under way.

### **Copper-Carbonate Seed Treatment Popular**

During the last few years the copper-carbonate seed treatment has come into almost general use. Instructions for applying this treatment to seed wheat are given in Farmers' Bulletin 1540<sup>3</sup> and in Miscellaneous Circular 108.<sup>4</sup> In these publications particular attention is given to use of hand-power equipment for applying the copper-carbonate dust. Since copper carbonate was first introduced, the idea of treatment by means of power-driven machines has grown rapidly. Such equipment makes continuous treating possible and results in a larger output of treated grain per day than is possible with the hand-power machine.

### **Cleaning and Treating Operations Can Profitably Be Combined**

The development of power-driven treating machines facilitates a combined attack on stinking smut and weeds, for such treating equipment can be economically operated in connection with modern grain-cleaning machinery. Moreover, the cleaning machine when operated ahead of the treater removes or breaks up a large number of the smut balls present and thereby aids in the effectiveness of smut control. Since stinking smut is a problem practically wherever wheat is grown in the United States, and as it is always a good policy to clean seed wheat before sowing, the combination operation should be of general interest. It opens up an opportunity not only to farmers who prepare their own wheat for sowing, but to others such as elevator managers or mill owners who wish to do custom cleaning and treating. As is clear from the section by Mr. Coke, pages 5 to 8, there is also opportunity here for a community enterprise.

### **Seed-Wheat Cleaning and Treating Hook-Ups**

There are many methods by which seed-wheat cleaning and treating machinery can be combined. The method that may best be used will depend either upon the kind of treating and cleaning machines that are already available or on the combination desired in case entirely new machinery must be purchased. Any machine that effectively cleans grain produced under local conditions can be hooked up with practically any efficient smut-treating machine. To make it possible to clean and treat a large quantity of wheat per hour the outfit should be equipped for power operation. Elevators and spout-

<sup>3</sup>TISDALE, W. H., and TAPKE, V. F. SMUTS OF WHEAT AND RYE AND THEIR CONTROL. U. S. Dept. Agr. Farmers' Bul. 1540, 17 p., illus. 1927.

<sup>4</sup>TAPKE, V. F., and MEIER, F. C. COPPER-CARBONATE SEED TREATMENT FOR STINKING SMUT OF WHEAT. U. S. Dept. Agr. Misc. Circ. 108, 4 p., illus. 1928.



ing so arranged as to reduce manual labor in handling the grain materially lessen the labor cost. Stationary outfits may be built for use as central stations, or the equipment may be mounted on trucks and used for itinerant work. Evidence of the success attained by the truck shown on the title-page is contained in pages 7 to 8. In 1928, to demonstrate the possibilities of combining the equipments for cleaning and treating, one of the eastern railroads working with the Pennsylvania State College of Agriculture operated a special car equipped with seed treating and cleaning apparatus. (Fig. 2.)

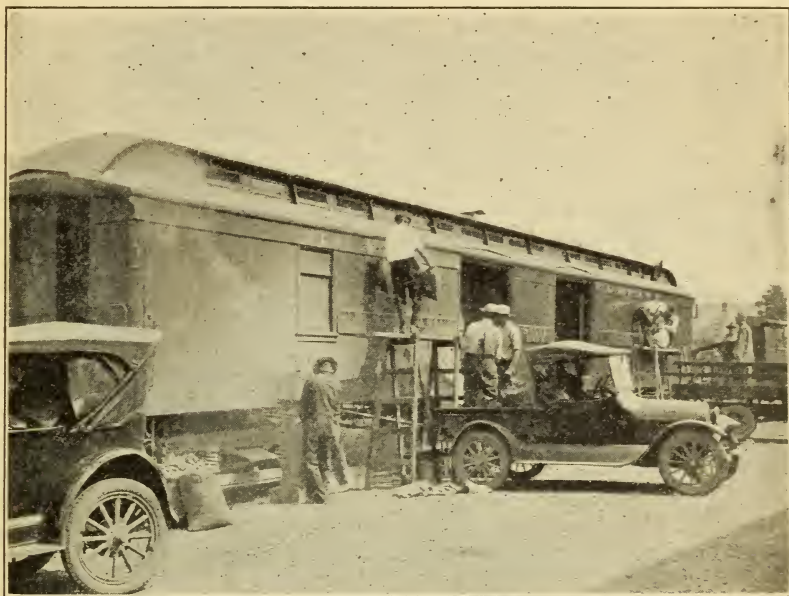


FIG. 2.—A demonstration of combined cleaning and treating of seed wheat at Gettysburg, Pa. This wheat-smut-control car, operated by the Reading Railway system and the Pennsylvania State College of Agriculture, made twenty-nine 1-day stops in Pennsylvania and two in New Jersey during the fall of 1928. In the right-hand three-quarters of this car a motor, a mill-size disk separator, a fanning mill, and a copper-carbonate duster were mounted in a row and connected by elevator equipment. Seed wheat was poured into the hopper on the upper right-hand side. Screenings and treated cleaned grain were obtained from spouts at the bottom of the car. Wheat poured into the hopper on the left passed through cleaning and treating outfits built as a unit and driven on the same shaft as the other equipment. Farmers kept these two outfits working at full capacity for the 29 days during which the car was on the road.

The advantages of performing these two operations at the same time have come to be recognized by manufacturers, with the result that several such combined cleaning and treating outfits are on the market at the present time.

## COPPER-CARBONATE TREATING AND CLEANING MACHINE A COMMUNITY ENTERPRISE

By J. EARL COKE

During 1926 and 1927, while working as assistant county agent in San Luis Obispo County, Calif., the writer had an opportunity to assist with the organization and operation of a community grain-cleaning and copper-carbonate treating machine. The idea of rendering this service of cleaning seed wheat and treating it for stinking smut on the ranch at cost originated with a local grain grower, J. H. Botts. The proposed plan was discussed at the annual meeting of the grain

department of the county farm bureau, and a committee was appointed to develop the project.

Prior to the starting of this project about 30 per cent of the grain growers in San Luis Obispo County had used copper carbonate to control smut on wheat. This was due to the work of W. W. Mackie, of the agronomy division of the University of California, and the agricultural extension service. The methods of application that were used by many of the growers often resulted, however, in incomplete control. This fact, combined with the nauseating effect on the operator if he inhaled the dust, retarded the complete adoption of this method of smut control. This project was started for the purpose of developing an effective and economical system for treating seed grain without the copper-carbonate dust nuisance.

During the first season a fanning mill and a truck were rented, an engine and a copper-carbonate duster were purchased, and a man was hired to take this equipment from ranch to ranch. It was necessary during that year to remove the equipment from the truck at each place. As the work was started late in the season, the outfit operated only 33 days, but 214 tons (7,135 bushels) of grain were thus treated.

### Equipment Used

Determined that this project should be the means of reducing smut damage and weed seeds in the grain throughout the entire district, the farm bureau committee, for the second season, became obligated for \$650 borrowed from the bank. With this, a triple-capacity disk-cleaning machine, a 3-horsepower engine, and two steel elevators were purchased. The copper-carbonate treating machine used the previous year was reconditioned, a motor truck obtained, and a man was engaged to run the outfit for the season. (Fig. 3.) The members of the committee, with the aid of George P. Bodnar, assistant marketing specialist, U. S. Department of Agriculture, and the writer, mounted the equipment (fig. 4) and started operations.<sup>5</sup>

### Operator Employed

The operator, who owned the truck, was paid \$1 a ton for grain handled. He obtained free board at the various ranches and carried his own bedding. His work consisted of (1) moving the machinery from ranch to ranch, (2) adjusting the equipment on the truck, (3) furnishing gasoline and oil for the truck and the gas engine (these supplies were obtained at all the ranches), (4) keeping the equipment in running order, (5) carrying the sacked grain from the granary and "cutting" into the receiving bin, and (6) watching and regulating the copper-carbonate dust supply.

The equipment was formally leased to the operator for \$1 a month to relieve the committee of liability under the workmen's compensation act. Fire insurance was also carried on the equipment owned by the farm bureau.

### Method of Carrying on the Work

Before operation started, committeemen were appointed in each of the six farm bureau centers located in the grain-growing district. The members of this committee received orders from the farmers for cleaning and dusting seed wheat. When the machine came into a new district, the farmer-center committeeman in charge gave the

<sup>5</sup> Copy of working drawings may be obtained from Bureau of Agricultural Economics.



operator a schedule of farms. This method increased the number of orders received and eliminated unnecessary traveling.

To set up the equipment involved pulling the elevators to a perpendicular position, adjusting the jacks to steady the truck, putting on the receiving bin, placing the grain spouts and sacks to catch tailings, and adjusting belts. The farmer was responsible for having sacks and twine on hand as well as a man to take the grain from the machine and sew up the sacks when filled. At the conclusion of the job on a given farm, the cleaner and duster were cleaned of grain (several varieties are grown in this district), and the machine was made ready to move.

The operator then made out in duplicate a bill giving date, name, address, pounds of copper-carbonate dust sold and price, number of tons of grain handled, and the total charge. Immediate cash payment was usually made to the operator, who marked the bills "paid,"

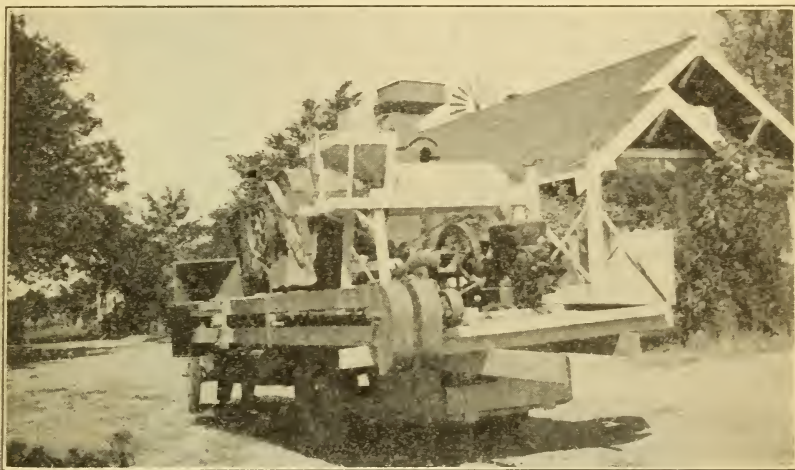


FIG. 3.—The San Luis Obispo County combination power-driven grain-cleaning and copper-carbonate dust treating machine, assembled on an automobile truck, with elevators folded, ready for moving from one ranch to another. The illustration on the title-page shows the machine set up and at work

giving one copy to the farmer.<sup>6</sup> The items were then listed by the operator in a double-page farm-account journal, with columns for date, name, address, total amount received or paid, pounds of dust purchased (with price), pounds of dust sold (with price), tons of grain dusted and cleaned (with price), tons cleaned or dusted (with price), equipment purchased, miscellaneous, and labor. Money received was deposited in the bank, and the bills were entered in a similar book kept in the farm bureau office.

#### Four-Fifths of Seed Grain Handled

This service was used by 134 grain growers during the season. The machine operated from August 30 to November 19, working 74 days, a total of 981 hours (including moves), an average of more than 13 hours a day. During this period 1,057 tons (35,233 bushels) of grain, mostly wheat, were handled by the machine. This represents about four-fifths of the total grain seed used in the county. For actual working time, the machine handled an average of 50 bushels an hour.

<sup>6</sup> Of 134 grain growers, 6 asked for time in making payment; no accounts were lost.

A charge of \$2.55 per ton of grain cleaned and dusted, and \$2 per ton for grain cleaned or dusted, was made. The weight was estimated by the operator and the farmer. The above charges do not include the cost of copper-carbonate dust, but this material was carried on the machine and sold to the farmers at 23 cents a pound, being 1 cent above the purchase price. Copper carbonate was not entered as a fixed charge, because farmers differed as to the quantity of dust needed on the seed. As the sale price of copper carbonate from the farm bureau machine ranged from 1 to 4 cents below the usual retail price, 2,784 pounds were sold, representing nearly all of the dust used by the machine for the season.

### Cost of Treating and Recleaning Low

At the close of the season, after all equipment and repairs (amounting to about \$700), labor \$1,155, insurance, etc., had been paid for and a reserve of \$75 set aside for the following season, \$630 was refunded to the farmers, which was 61 cents a ton for grain cleaned and dusted and 48 cents a ton for grain cleaned or dusted. Thus the actual cost to the farmer for a thorough job of cleaning and dusting at the

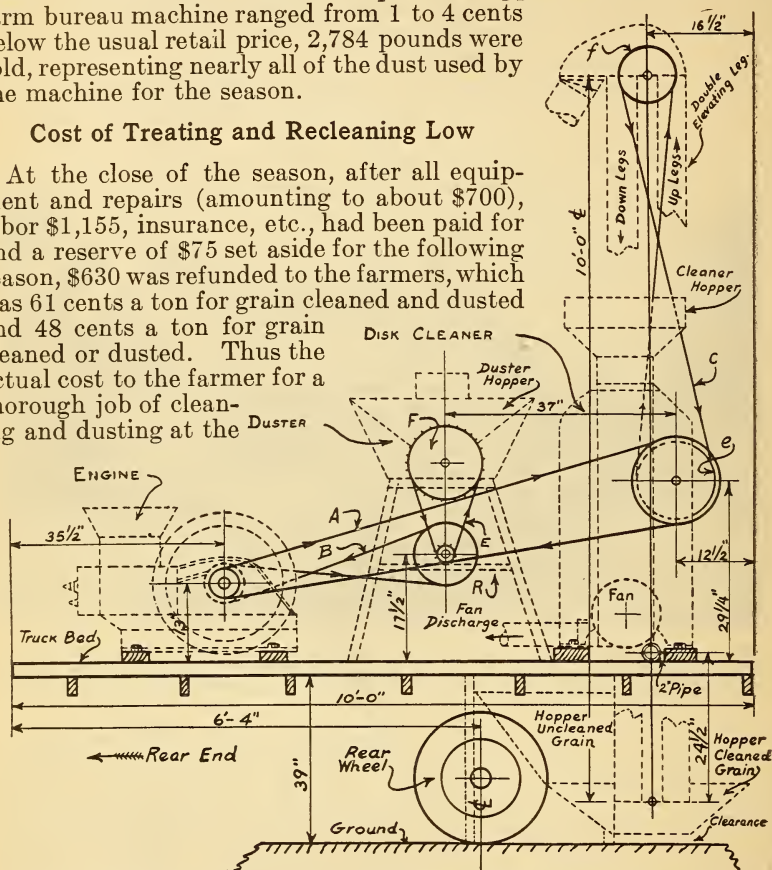


FIG. 4.—Side view of the power-driven combination grain-cleaning and copper-carbonate dust-treating machinery installed on an automobile truck. Belt A is the main driving belt for operating the cleaner. Belt B operates the dusting machine. Belt C, located on the opposite side, drives the double elevator leg.

ranch was \$1.94 a ton, and the cost for dusting or cleaning was \$1.52 a ton. The normal rate for commercial cleaning in this district is \$2 a ton, and there is no commercial copper-carbonate treating service. Thus the farmer was saved from 1 to 4 cents a pound for copper carbonate, and besides saving the cost of hauling his seed to and from town was given the service of cleaning and dusting at a figure 6 cents below the commercial cost of cleaning only.





